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(54) **Height adjustable bumps for road traffic control**

(57) A system for controlling the speed of vehicular traffic on a road comprises a plurality of adjustable height bumps disposed at intervals along the length of the road. The heights of individual bumps in the direction of vehicular traffic are preferably adjustable to provide increasingly noticable indications of speed as the traffic travels along the length of the road. The system is useful to impose speed restrictions, for example at road works or in adverse weather conditions.

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TRAFFIC CONTROL

This invention concerns the control of vehicular traffic.

In recent years, vehicular traffic on the roads has increased significantly. This has had a number of effects. The sheer density of the traffic in terms of numbers of vehicles for a given length of road can, for example, become so great that a minor error on the part of one driver in a stream of traffic travelling at high speed results in a major accident involving large numbers of vehicles, often with fatalities. Unseen hazards, such as fog, also lead to accidents, especially when the vehicles are travelling at high speeds.

High volumes of traffic, and especially of ever heavier commercial vehicles, have also led to roads having to be

repaired at frequent intervals. This results in road works with a consequent restriction in road width and, on motorways, contra-flow systems with a reduced number of often relatively narrow traffic lanes. Fog, road works, contra-flow systems and even vehicle accidents themselves, represent major hazards to vehicles travelling at high speed, and they have led to increasing numbers of multiple vehicle accidents.

In an attempt to reduce vehicle speeds through such hazards, and especially in contra-flow systems on motorways, highly visible warning signals have been used, including flashing lights, brightly coloured barriers, and the imposition of reduced maximum speeds combined with the imposition of fines. However, drivers all too frequently still ignore the maximum speed warnings and fatal accidents continue to occur.

According to the present invention there is provided a system for controlling the speed of vehicular traffic on a road, the system comprising a plurality of adjustable height bumps disposed at intervals along the length of the road.

The present invention has the advantage that the bumps can be adjusted to set a maximum speed at which driving is comfortable, and indeed the bumps can be set to a height which physically imposes a reduced speed.

The bumps can be of various shapes, but they are preferably elongate, for example similar to the so-called "sleeping policemen".

In order to give drivers advanced warning of the imposition of a speed limit as a result of the height of adjustable bumps in the system, bumps encountered by vehicles earlier in their passage along the road are preferably set to progressively increasing heights so that the warning of excessive speed becomes more pronounced as the vehicle approaches the hazard.

For example, successive bumps can be set at heights which increase by about 5mm from one to the next.

Although the bumps can be raised rapidly to set a particular configuration of warning bumps, they will in general be raised slowly so that traffic already travelling over bumps which are to be raised to the greatest height are initially detected by the traffic as though they are only giving an advance warning of a hazard. If this were not to occur, damage may occur to vehicles in this section of the system.

The present invention has particular advantage with roads in which traffic normally travels in one direction. Thus it is of particular advantage for motorways, but it can also be used with other dual carriageway roads. It can, however, be used with two-way roads, but this can impose restrictions on the bumps themselves and how the system can be used as drivers travelling in one direction without the bumps raised should not be able to cross onto the other side of the side of the road where the bumps are raised.

The adjustable height bumps can extend across the whole width of the road or a particular carriageway. However, it is preferred that the bumps extend over only part of the width of the road or carriageway as this can enable different levels of warning to be given in the different lanes of a multi-lane road such as a motorway where the speeds in the various lanes tend to differ. This can be achieved by the height of the bumps being different in the various lanes.

The bumps can be of various shapes, elongate bumps generally being preferred, with the length of the elongate bump disposed substantially perpendicularly to the direction of traffic flow. Elongate bumps are also preferred as they enable a single actuating mechanism to be used to adjust the height of each bump. The cross-section of each bump is preferably

symmetrical and advantageously smoothly curved, as with so-called "sleeping policemen". This enables traffic to have the same degree of warning for a particular height of bump irrespective of the direction of traffic flow. This can be important where the direction of travel of the traffic is reversed as in a contra-flow, and it is particularly so where the road normally has two-way traffic flow.

The number of adjustable height bumps on a particular length of road will in general be selected to provide a sufficient frequency of warnings that drivers will not forget an earlier warning. Roads with normally higher traffic speeds will usually require the bumps to be spaced at greater distances than those with normally lower speeds.

Various methods can be used to adjust the height of the variable height bumps. Hydraulic or compressed air actuated mechanisms can be used, for example supplied with hydraulic fluid or compressed air under pressure from a pump which feeds pressurised fluid or air to a number of bumps. Alternatively, the bumps can be actuated electrically.

The bumps can be such that they are of fixed height once set. However, it may be preferable in some instances for the bumps to be resilient. For example, they could be spring loaded, and they could then be arranged to provide an audible warning in addition to the physical jolt experienced when a vehicle passes over the bump.

The upper or road surface of the bumps is preferably of a resilient material and especially so that foreign matter cannot gain access to the actuating mechanism for the bumps which might otherwise cause corrosion or jam the actuating mechanism. A resilient surface can also provide a smooth curve similar to that of a "sleeping policeman".

Although the system of the present invention can be actuated manually, the bumps which are actuated and their respective heights are preferably controlled by computer. Thus the computer can be programmed to adjust a number of bumps in a particular direction of traffic flow to increasing heights so that the desired traffic speed is imposed before a hazard. As with conventional visible signs, this can be set in motion from a central control centre, for example when conventional hazard warning signs are actuated. In a preferred method of operation of systems of the present invention, the bumps are actuated by an automatic fog detector.

Claims

1. A system for controlling the speed of vehicular traffic on a road, the system comprising a plurality of adjustable height bumps disposed at intervals along the length of the road.
2. A system according to claim 1, wherein the bumps are elongate.
3. A system according to claim 2, wherein the elongate bumps extend substantially perpendicularly to the direction of traffic flow on the road.
4. A system according to any of the preceding claims, wherein the height of the bumps in adjacent lanes of a multi-lane road are independently controllable.
5. A system according to any of the preceding claims, wherein the bumps are of substantially symmetrical cross-section in the direction of traffic flow.
6. A system according to any of the preceding claims, wherein the upper surface of the bumps is of a resilient material.
7. A system according to any of the preceding claims, wherein the upper surface of the bumps is arranged to prevent the ingress of moisture or other foreign matter into the operating mechanism of the bumps.
8. A system according to any of the preceding claims, wherein bumps are actuatable hydraulically.
9. A system according to any of the preceding claims,

wherein the adjustable height bumps are controlled by computer.

10. A system according to any of the preceding claims, wherein the adjustable height bumps are actuated by an automatic hazard warning system.